

CLAIMS

What is claimed is:

1. A fuel bundle comprising:

a channel having a perimeter wall and opposed ends and including at least one fluid passage within the perimeter wall extending between the opposed ends;

a plurality of fuel rods disposed within the channel, the fuel rods including both full-length rods and part-length rods; and

the part-length rods distributed in two rod groups including,

a first rod group having part-length rods each distributed adjacent to the fluid passage, the first rod group including at least one pair of adjacent part-length rods; and

a second rod group having part-length rods each distributed within and adjacent to the perimeter wall, the second group including at least one pair of adjacent part-length rods.

2. The fuel bundle of Claim 1, wherein a void formed above each of the part-length rods together with the at least one fluid passage each define a water trap when containing a fluid, to trap neutrons.

3. The fuel bundle of Claim 1, further comprising:

a generally parallel configuration of the fuel rods; and

at least one support member connected to the channel to equidistantly space adjacent ones of the fuel rods in the generally parallel configuration.

4. The fuel bundle of Claim 3, wherein the opposed ends comprise:
 - a lower feed end having a first support structure for receiving a lower end of each of the fuel rods and the fluid passages; and
 - an upper discharge end having a second support structure for receiving an upper end of each of the full-length fuel rods and the fluid passages.
5. The fuel bundle of Claim 4, wherein the channel further comprises:
 - a connecting structure for supporting the channel.
6. The fuel bundle of Claim 1, wherein the second rod group further comprises a plurality of subgroup pairs of the part-length rods, each subgroup pair positioned adjacent to the perimeter wall.
7. The fuel bundle of Claim 6, wherein the second rod group further comprises both pairs and individual ones of the part-length rods, the pairs and the individual ones of the part-length rods spaced about the perimeter wall.

8. A fuel bundle, comprising:

a generally hollow channel having a perimeter wall;

a plurality of both full-length and part-length fuel rods disposed within the channel, each arranged in one a plurality of rows and one of a plurality of columns of the fuel rods,

each of the rows and each of the columns disposed along a respective centerline, such that adjacent ones of the fuel rods on each of the centerlines define each of a plurality of face-to-face pairs of fuel rods; and

the part-length fuel rods being separable into two rod groups including,

a first rod group spaced from the perimeter wall such that at least one of the full-length fuel rods is disposed between each part-length fuel rod of the first rod group and the perimeter wall, the first rod group including at least one pair of adjacent part-length rods; and

a second rod group having part-length fuel rods disposed adjacent to the perimeter wall, the second group including at least one pair of adjacent part-length rods.

9. The fuel bundle of Claim 8, wherein the channel includes an inlet end, an outlet end oppositely positioned from the inlet end, and at least one fluid passage defined within the perimeter wall extending between the inlet end and the outlet end.

10. The fuel bundle of Claim 8, wherein the channel has a rectangular cross-section.

11. The fuel bundle of Claim 8, wherein adjacent ones of the fuel rods along each of the rows and columns have a fixed spacing therebetween.

12. The fuel bundle of Claim 8, wherein the second rod group further comprises a plurality of subgroup pairs, each subgroup pair having two adjacent part-length fuel rods.

13. The fuel bundle of Claim 12, wherein the second rod group further comprises both pairs and individual ones of the part-length rods.

14. The fuel bundle of Claim 12, wherein each rod subgroup pair forms face-to-face pairs with another rod subgroup.

15. The fuel bundle of Claim 9, further comprising:
a circular shaped tube defining each fluid passage and having the first rod group disposed adjacent thereto.

16. The fuel bundle of Claim 9, further comprising:
a rectangular shaped tube defining each fluid passage and having the first rod group disposed adjacent thereto.

17. A fuel bundle providing multiple length fuel rods, comprising:
 - a channel having four interior walls and at least one water passage defined therein;
 - a plurality of full-length fuel rods, generally disposed face-to-face in column/row alignment, including a first set located adjacent to the four interior walls, and a second set located adjacent to the water passage;
 - subgroups of part-length fuel rods each disposed adjacent one of the four interior walls and interposed with the first set of full-length fuel rods, at least one subgroup including a pair of adjacent part-length rods; and
 - a clumped group of part-length fuel rods disposed about the water passage, the clumped subgroup including at least one pair of adjacent part-length rods.

18. The fuel bundle of Claim 17, wherein the channel further comprises:

at least one lower support to space the full-length fuel rods, the part-length fuel rods, and the water passage; and

at least one upper support to space the full-length fuel rods and the water passage.

19. The fuel bundle of Claim 18, wherein the channel further comprises at least one intermediate rod support disposed between the lower support and the upper support, positioned to space the full-length fuel rods, the part-length fuel rods and the water passage.

20. The fuel bundle of Claim 17, wherein the channel further comprises a body lifting member.

21. The fuel bundle of Claim 17, wherein each water passage has a shape selected from the group consisting of a circle, an oval, a square, a rectangle, a cruciform and a free-formed shape.